



Bio-based strategies and roadmaps for enhanced rural and regional development in the EU



Best practice guide on strategy development

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EXECUTIVE SUMMARY

The combination of academic and applied research is one of the main assets of BE-Rural. The project set up awareness-raising processes for all categories of local actors on the need to strengthen the bioeconomy at local level and generate positive economic, environmental and social prospects based on regional potentials. Given the above, BE-Rural has organised a series of face-to-face interactions between the pilot regions, which are involved in the project: Stara Zagora in Bulgaria, Vidzeme and Kurzeme in Latvia, Strumica in North Macedonia, Szczecin and Vistula Lagoons in Poland and Covasna County in Romania. These interactions took place during webinars and conferences that aimed at facilitating the exchange of good practices and at enabling individual and institutional learning processes in partner regions.

The intense interactions between the stakeholder working groups in the five focal regions resulted in a series of best practice exchanges on bioeconomy strategy development processes. These best practice examples have been assembled into the present “Best Practice Guide on Strategy Development”. The guide comprises 15 best practice cases split into two sections: regional strategy initiatives and business model initiatives, which were developed and implemented within the five countries, in which BE-Rural’s Open Innovation Platforms (OIPs) are located, with reflection on their outcomes and lessons learned.

Lessons learnt and transferability of the best practices, presented in this guide, are to be found mainly in the methodological approach, cross-sectoral links to other sectors such as agriculture and forestry, the focus on traditional sectors and regional values. All the features presented can be seen as drivers of innovative bio-economic business models leading to an integrated use of bio-based products and mindset change at societal level.

In the context of BE-Rural, the best practices in strategy, technology, and product development are a source of learning, which is useful further in the project work. In particular, the findings of this report contain valuable insights that can support the five OIPs in the formulation of strategy and roadmap documents, as foreseen in Task 5.4

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Abbreviations

CF	Cohesion Fund
EAFRD	European Agricultural Fund for Rural Development
EC	European Commission
EDP	Entrepreneurial Discovery Process
EIT	European Institute of Technology
EMFAF	European Maritime, Fisheries and Aquaculture Fund
EU	European Union
ERDF	European Regional Development Fund
ESF+	European Social Fund Plus
ICT	Information and Communication Technology
JRC	Joint Research Centre
KE-CB	Knowledge Exchange-Capacity Building
NCDIEL	National Centre for Development of Innovation and Entrepreneurial Learning
NGOs	Non-Governmental Organizations
OIPs	Open Innovation Platforms
PDO	Protected Designation of Origin
PE	Population Equivalent
PGI	Protection of Geographical Indication

PR	Public Relations
RDI	Research Development Innovation
S3	Smart Specialisation Strategy
SMEs	Small and Medium-sized Enterprises
STRING	STrategies for Regional INnovative Food Clusters
SWG	Stakeholder Working Group
SWOT	Strengths, Weaknesses, Opportunities, Threats
TAIEX	Technical Assistance and Information Exchange
UN SDGs	United Nations Sustainable Development Goals

1 Introduction

The European Commission defines the bioeconomy as a concept that covers “*all sectors and systems that rely on biological resources (animals, plants, micro-organisms and derived biomass, including organic waste), their functions and principles. It includes and interlinks land and marine ecosystems and the services they provide; all primary production sectors that use and produce biological resources (agriculture, forestry, fisheries, and aquaculture); and all economic and industrial sectors that use biological resources and processes to produce food, feed, bio-based products, energy, and services. To be successful, the European bioeconomy needs to have sustainability and circularity at its heart. This will drive the renewal of our industries, the modernisation of our primary production systems, the protection of the environment and will enhance biodiversity*” (European Commission 2018).

Put in simple words, the bioeconomy represents one of the answers that society should give to the climate change problem to solve the dilemma of, on the one hand, feeding more and more people with less environmental impact, while, on the other hand, ensuring the use of more renewable biological resources and thus reducing the fossil resources currently in use.

The bioeconomy has a huge potential of creating new jobs in local contexts triggered by innovative businesses. These are based on the enhanced cooperation between academia, industry, policy, and civil society. The development of the bioeconomy contributes also to the achievement of the United Nations Sustainable Development Goals. Finally, the bioeconomy sets the basis for a healthier way of living both for humans and animals.

The bioeconomy is a complex concept implying elaborated implementation processes, requiring the involvement of a diverse range of actors including policy makers and enterprises, RDI players and catalyst organisations and last, but not least, the citizens. It demands a mind reset of the entire society towards a sustainable way of thinking in terms of resources, climate, social justice, and welfare. Against this background, one of the main challenges for the successful development and implementation of regional bioeconomy strategies is enlarging “the usual circle of suspects” towards an inclusive spectrum of stakeholders, thereby triggering innovative co-creation processes at regional level.

Against this background, BE-Rural took on board the task of developing bioeconomy strategies/roadmaps in five pilot regions: Stara Zagora (BG), Vidzeme & Kurzeme (LV), Strumica (MK), Szczecin & Vistula Lagoons (PL) and Covasna County (RO).

The strategy documents will be integrated into the regional/national policy framework (e.g., regional/national Smart Specialisation Strategy, Bioeconomy Strategy etc.). The roadmap documents will outline actions that are then taken forward by a range of actors, e.g., businesses or cluster organisations. The individual actions outlined and elaborated in the documents will vary depending on the regional context (i.e. available biomass streams, identified business models); however, the following aspects will be addressed in all strategy and roadmap documents: business sector development; RDI capacities and activities; use of diverse EU, national and regional funding streams; synergies with other policy fields, notably related to rural and regional development, as well as smart specialisation strategies; education / information in relation to sustainability; international collaboration and sharing of good practices among regions. All strategy and roadmap documents will be developed with the strong ambition to feed into the mid-term review of the 2021-27 EU cohesion policy, rural development, and fisheries policies (ERDF, ESF+, CF, EAFRD and EMFAF) programmes and any mid-term updating of S3 or regional innovation strategies in the 2021-27 programmes.

The process of co-creating a bioeconomy strategy or roadmap involves a complex interaction between regional and local actors. Also, the stages of such a process require the awareness and training of these actors. Figure 1 shows BE-Rural’s conceptual framework.

Figure 1: The BE-Rural Approach

Source: own elaboration

The present report mirrors some of the experiences made in the OIP regions, which could be useful in the elaboration of bioeconomy strategies / roadmaps. It emphasises the importance of individual and institutional processes that have been learned and the involvement of all relevant actors in the strategy-building process with a special focus on the civil society.

Hence, the guide collects a series of cases from the OIP regions, summing up a total of 15 best practices split into two sections: regional strategy initiatives and business model initiatives, which were developed within the OIP countries, with reflection on their outcomes and lessons.

The selection of the regional examples followed a qualitative approach and resulted from extensive discussions and consultations, presentations within BE-Rural's pop-up store events as well as the contributions made during the knowledge transfer and capacity building seminars and the mid-term workshop held with the occasion of the joint Bulgarian-Romanian Cluster Conference (28-29 September 2020), which revealed the regional needs of the process for building bio-based development models in the OIP regions. The process was accompanied by extensive feedback loops with the stakeholder groups from the envisaged project regions. The criteria taken into consideration were:

- Reference to the bioeconomy in terms of supporting regions in transforming their needs, strengths and competitive advantages into marketable goods and services with the aim to prioritize investment in research and innovation through a bottom-up approach, based on the principle of co-creation. In that regard, selected best practices cover various aspects / steps of the strategy development (such as main goals, financing, how to develop the governance structure or main technology topics). This includes bioeconomy-related innovative/pilot initiatives or approaches to building new value chains etc., but also aspects such as building up civic engagement, "buy-in" from citizens/traditional businesses; or building sustainability principles into the strategy (coping with trade-offs);
- Relevance for the development of bioeconomy strategies / roadmaps in terms of location (regional / national), timeframe (ongoing or not older than 5 years) and beneficiaries (directly interested in bioeconomy processes);
- Clear identification of output and results; and
- Transferability.

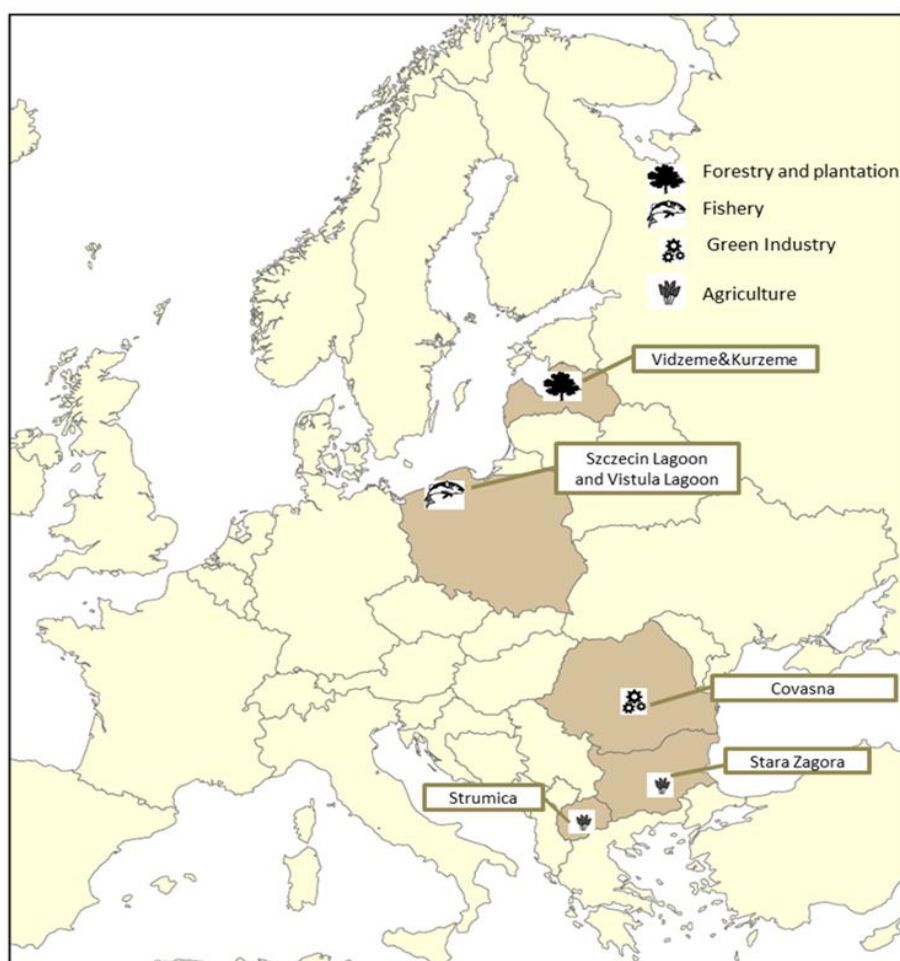
The described best practices will provide relevant stakeholders in the regions covered by BE-Rural with a useful tool meant to support them in the challenging process of setting up dedicated bioeconomy strategies and / or roadmaps. Furthermore, they can be of use for any individual or organisation dealing with strategy-building processes. Finally, it shows that excellence can be found even in remote areas away from the European innovation mainstream.

2 Best practices on regional strategy initiatives

Strategies with reference to the bioeconomy should support regions in transforming their needs, strengths and competitive advantages into marketable goods and services and aim to prioritize investment in research and innovation through a bottom-up approach, based on the principle of co-creation. The strategies could help regions, including rural communities, to anticipate, plan and support their own process of economic modernization.

This section refers to concrete examples / best practices from the OIP countries (according to figure 2 below) that can be helpful in developing a bioeconomy strategy.

Figure 2: The Open Innovation Platform (OIP) Regions in the framework of BE-Rural Project; main sectors



Source: own elaboration

The activities of the BE-Rural project and especially the inter-regional webinars showed the presence in the OIP regions of various initiatives for the development of smart specialisation or sectoral strategies, mainly in the agri-food sector, which can be extrapolated and used in the development of a bioeconomy strategy/roadmap. It should be mentioned that Latvia already has a national bioeconomy strategy in place.

The case studies were selected based on the advice from OIP facilitators but also of specialists from the countries and regions represented by these facilitators. The selection was made from the perspective of similarities between with the areas covered by the bioeconomy. It also intends to cover multiple dimensions, such as:

- **Geographical scale:** The strategy initiatives cover either a country (Latvia, North Macedonia, Bulgaria) or a region / county (Romania - Centru Region / Covasna county).

- **Thematic focus:** Areas of these strategy initiatives are diverse, starting from the challenges and needs of regional / national development identified in entrepreneurial discovery processes (Romania, Latvia, North Macedonia) and to broad sectoral analyses / strategies such as the bioeconomy or agri-food as important component (Bulgaria, North Macedonia, Romania).
- **Leadership:** The elaboration of strategic documents belongs either to governmental institutions (Latvia, Bulgaria, North Macedonia) or to local public authorities (Municipality of Strumica), clusters (Covasna County) or regional development agencies (Romania – Regional Development Centru Agency).
- **Participants:** The stakeholders involved in the elaboration of these initiatives are companies, research and development entities, local public administrations, civil society but also individual citizens, working together or separately, depending on the topic.
- **Transferability:** The process of strategy development increases the capacities of regional stakeholders and, as has been recognized in Bulgaria and Romania, allows the transfer of the methodological approach to other policy fields (Bulgaria, North Macedonia).
- **Learning from others:** Best practices from Latvia (Bioeconomy Strategy 2030) make use of experiences in other OIP regions or the experience of Covasna county within the STRING project can be translated to other countries (e.g., Italy, Spain, Hungary).

The presented strategy initiatives can constitute an information base for the preparation of the bioeconomy roadmap / strategy and its synergies with other national, regional or local strategies.

2.1 Strategy of Bulgaria for strengthening the role of agriculture in the bioeconomy

The strategy aims to define and justify the role of the agricultural sector in the bioeconomy, as well as to outline the strategic policy framework to encourage the industry to participate more in the production and consumption chain of biological resources. It is a document defining national goals and priorities for the agricultural sector in the context of the bioeconomy.

The document analyses the current situation and the place of the agricultural sector in the system of bioeconomy in Bulgaria; based on a SWOT analysis, the research team has assessed the needs with justification of the choices, which are reduced to:

- More innovative **resource efficiency and competitive production**, combining food security with the **sustainable use of renewable resources for industrial purposes**, while ensuring environmental protection.
- Mobilize **research and innovation in the agricultural sector** by stimulating private investment, **developing new value chains**, and engaging stakeholders.
- Need for education and training in the field of bioeconomy to **prepare a skilled workforce**.

In this regard, three strategic goals are set:

- **Sustainable management and development** of agriculture, forestry, and fisheries.
- Full use and development of research, partnerships for **exchange and transfer of innovations**.
- Improving **knowledge and skills**.

The developed Action Plan:

- identifies activities, expected results, stakeholders and institutions that will work together to achieve the set goals; and
- assesses the need for changes in the national legislation to implement the strategy and prepares an indicative financial framework with possible sources of funding for the envisaged instruments.

In conclusion, the mechanism for monitoring and evaluating the implementation is indicated, as well as recommendations for the preparation of a strategic plan for the Common Agricultural Policy 2021-2027. The document was developed in 2020 by a team of the Bulgarian Agricultural Academy.

The strategy for strengthening the role of the agricultural sector in the bioeconomy is a national document and has been developed in accordance with European and national bioeconomy policy, reflecting the concept approved in July 2018 by the Minister of Agriculture and Food of the Republic of Bulgaria.

The responsible institutions in Bulgaria have been highly satisfied with the quality of the developed strategy for strengthening the role of the agricultural sector in the bioeconomy, as it has been prepared in accordance with the concept of the Ministry of Agriculture and Food and according to the country's priorities, and it represents a good basis for the development of a national strategy in bioeconomy. An integrated approach has been applied and there is a good connection between the derived strategic goals and the planned activities for their achievement.

By applying a similar structure, an overview can be made on the state of agriculture and forestry and their relevant production and use of biomass, including the contribution of these sectors to the bio-economic development.

2.2 Smart Specialisation Strategy of North Macedonia

The S3 process in North Macedonia started in March 2018, when the letter of commitment from the country's government on starting the development of the National Research and Innovation Strategy for Smart Specialisation (RIS3) reached the JRC. At the same time, an inter-institutional working body was formed, consisting of the representatives from the government, relevant ministries, and academic community (S3 working group). The JRC was asked to support the process of development of the smart specialisation strategy. North Macedonia intends to adopt its RIS3 in 2021 by thoroughly following the JRC methodological framework for smart specialisation in the EU enlargement and neighbourhood countries (JRC S3 Framework).

Members of the North Macedonia's S3 working group have undergone training on S3 process in Slovenia and Belgium in a workshop with active participation of the country's S3 working group in all steps foreseen under the JRC S3 framework.

Participation in these activities enabled the country's S3 team to take on the first steps of the S3 process and to engage the analytical team within the working group to prepare the data for the analysis of economic, scientific, and innovative potential. To raise awareness on the smart specialisation process in the country, the S3 team of North Macedonia organised a two-day expert workshop on smart specialisation with the support of the TAIEX instrument and under JRC guidance. Experts presented all phases of the S3 process under the JRC S3 framework, with the focus on key elements and challenges for conducting successful mapping exercises and the entrepreneurial discovery process (EDP) phase. The country has finalised the overview of strategic documents related to the S3 process. The country's progress in accordance with the S3 roadmap has been reassessed and provisional dates for all phases have been laid down.

The mapping of economic, innovative, and scientific potential in North Macedonia has started in 2019 and it is currently ongoing. The quantitative mapping stage has been conducted by NCDIEL from Skopje, North Macedonia and has been finalised in 2019. The analysis provided the basis for identifying potential S3 priority domains in North Macedonia. Quantitative mapping will be followed by additional qualitative analysis to validate the results of the quantitative mapping stage. The qualitative mapping stage was planned for the second quarter of 2020.

The dialogue with a wide group of stakeholders within the EDP is going to take place after the completion of the analysis of the national economic, scientific, and innovative potential.

The S3 process in North Macedonia is led by the S3 working group whose work is coordinated by the Ministry of Education and Science and the Ministry of Economy. The same institutions will have an important role in the implementation of the RIS3. The S3 working group is composed of 13 representatives from governmental institutions and three representatives from the academic sector, with SDEWES – the OIP facilitator in the BE-Rural project – also taking part. Having that in mind, this

strategy could serve as a base point for the development of a bioeconomy roadmap for Strumica region. For the highest effectiveness of implementation, an action plan to the strategy should be prepared by the country's S3 working group. The action plan should include various instruments and action lines for the support of targeted priority areas.

The consultation on the evaluation and monitoring tools for the Research and Innovation Strategy for Smart Specialisation of the Republic of North Macedonia will be provided after the finalisation of the EDP stage. Preparation of the strategy draft is planned for 2021.

All stakeholders in the action areas of the strategy: economy and investments, agriculture and rural development, environment and energy efficiency, infrastructure and urban planning and workforce development.

The overall results are focused on:

- **Policy support and investments** in key national/regional priorities, challenges and needs for knowledge-based development, including ICT-related measures.
- **Building on the country's/region's strengths**, competitive advantages, and potential for excellence.
- **Support technological as well as practice-based innovation** and aim to stimulate private sector investment.
- **Full involvement of stakeholders** and encouragement for innovation and experimentation.

Successful and complete implementation of all the named objectives will be the hardest part to be accomplished. Nevertheless, throughout the period there will be many obstacles that have to be resolved and slight deviations due to financial aspects are expected. An improvement is foreseen with the development of a new strategy for local economy development with an emphasis on the bioeconomy, circular economy, and sustainability.

2.3 Strategy for local economic development of the Municipality of Strumica (2016-2020)

Strategic planning is a democratic process of creating a vision, mission, and objectives to achieve the desired future of a municipality and represents a useful tool for directing the activities in the form of a strategic document. The formulated vision was that the Municipality of Strumica should be a leading municipality in the region by 2020, with sustainable economic development, improved agricultural production and high standard/quality of life in urban and rural areas, protected and clean environment, with planned and qualitative infrastructure in accordance with the needs of the citizens and continuous development of the workforce in the municipality.

The mission defined in the strategic planning process was that by 2020 the Municipality of Strumica should have become more attractive for investments in order to further accelerate economic development and agriculture, with a healthy environment, with modern spatial and urban planning, but also with energy efficient public and private facilities, with developed infrastructure, with professional administration that works to the highest standards in order to provide high quality services to citizens and the business community.

The Strategy identified **five strategic goals and a set of activities** necessary to achieve them:

1. Sustainable development of the economy and competitive investment opportunities and their accelerated realization
2. Improved agriculture sector and increased quality of life in rural areas
3. Protected and healthy environment with energy efficient public and private buildings
4. Improved infrastructure and urban planning in accordance with annual programmes
5. The needs of the citizens
6. Highly developed and trained workforce, according to the needs of economic capacities.

The implementation of the Strategy will contribute to the enhanced economic development with positive impact on improving the quality of life of the citizens of Municipality of Strumica. During the preparation of this document, the working group consulted **all publicly available information**, as well as **previous planning documents of the Municipality** in several areas, in particular:

- Development Platform of the Municipality of Strumica 2007-2015.
- Energy efficiency programme of the Municipality of Strumica 2009-2013.
- Youth Strategy 2015-2020.
- Strategy for cooperation with the civil society sector 2015-2020.
- Strategy for development of education 2015-2020.
- Strategy for social protection of its citizens 2015-2020.
- Profile of the Strumica region - the municipalities of Strumica, Novo Selo, Bosilovo and Vasilevo.
- Programme for development of the Southeast Development Region 2015-2019.
- Business Support and Consulting Services for SMEs in Southeast Planning Region.
- Efficient use of solar energy for a better future - SP FUTURE.
- Gender Equality Strategy 2013-2020.

The draft strategy was prepared in several one-day working meetings, in the period October 2015 to January 2016, with the participation of all stakeholders in the priority areas: business representatives of the Local Economic and Social Council of the Municipality, the non-governmental organizations and the public sector/municipal administration.

The draft Strategy, in particular the Action Plan, was developed by a two-day working group workshop, and was finalized in consultation with the entire team. The draft Strategy was introduced and followed by a public discussion with the citizens and all stakeholders in the Municipality. After incorporating all acceptable remarks and suggestions, the Strategy was discussed by the Council of the Municipality of Strumica, after which it was adopted by incorporating additional indications by which agreement was reached. In addition to group work, a survey/questionnaire was prepared to determine the situation, identifying the problems of the business sector, as well as collecting suggestions for improving economy to raise the overall quality of life and working conditions of citizens in the Municipality of Strumica. Thus, in preparing the document most of the stakeholders contributed to the development of a comprehensive and useful strategic document that reflects the needs and suggestions of the population in the Municipality.

The beneficiaries are all stakeholders in the areas of action of the strategy: economy and investments, agriculture and rural development, environment and energy efficiency, infrastructure and urban planning and workforce development.

The output is **Strategy for local economic development** with an overview of the current situation and guideline for the near future:

- analysis of the environment;
- SWOT analysis;
- defining the vision, mission, and common values of the Municipality of Strumica;
- defining priority areas, strategic goals, and projects;
- guidelines for monitoring and evaluation of results (monitoring and evaluation);
- risk management procedure; and
- preparation of an action plan for implementation.

Overall, the region is leaning towards cross-border cooperation that is supported by various projects. A lot of improvement was done with the infrastructure regarding the road connection with the industrial

zones, which are important for the agricultural sector. In terms of environmental protection and health environment, an improvement is being made as the illegal landfills are being cleaned. As to awareness raising, a EU House was opened in the centre of the Strumica.

The EU House is thought as a "lively" space in which young people from the municipality of Strumica and beyond, will preserve and nurture European values, through various forms of socializing, info-services, EU discussions, project implementation, EU promotional events, exhibitions, film, music and multimedia events and workshops. Regarding the energy efficiency, the public building has been renovated and smart LED lighting has been placed on the streets. Improvements in the secondary gas structures and subsidies for the households were also provided.

In 2019, the first "Agro Fair 2019" was held in Strumica, which was attended by agricultural producers and producers of agricultural machinery. The fair is an event that undoubtedly deserves the agricultural producers, but also all those who directly or indirectly depend on agriculture. In the realization of this project, the Municipality of Strumica was the first municipality in the country that initiated a procedure for nature protection with sustainable use of wild-growing natural products in its region, through protected local products, branded as "Belasica - natural product".

Overall, the process of adopting the Strategy followed a well-structured procedure that involved different stakeholders in an open and transparent discussion. The experiences can be translated for the adoption and development of regional bioeconomy roadmaps or strategies. The existing experience shows that there is sufficient local and national capacity for the development of such strategies. Hence, similar steps to those taken for the Strategy for local economic development of the Municipality of Strumica (discussed above) can be taken for the adoption a bioeconomy strategy.

However, along with the lessons learned from this procedure, one should also consider that the bioeconomy strategy should target a narrower and specific focus group, which is tailored for the issues related to the bioeconomy and rural development.

Getting different actors on board for such a discussion may be challenging, since there is no clear short-term incentive for their contributions. In the future, organizing more targeted workshops, conferences, roundtables, as well as keeping an active log of stakeholders may help identify and more clearly differentiate the relevant actors that should be included in the development of the strategy.

2.4 Latvian Bioeconomy Strategy 2030

Latvia is the first Baltic country having developed its own national Bioeconomy Strategy.

The strategy's vision is to develop the bioeconomy sectors of Latvia into innovation leaders in the Baltic States in preserving natural capital, increasing its value and in efficiently and sustainably exploiting it.

Latvia aims to reach efficient and sustainable exploitation of natural resources in the bioeconomy industries and provide growth of the national economy by providing higher added- value products, promoting exports and employment. Meanwhile, it aims at balancing economic interests with ensuring environmental quality and preserving and enhancing biodiversity.

The strategic goals for the bioeconomy development are divided into three main groups:

1. **Advancement and retention of employment** in the bioeconomy sectors to at least 128,000 persons.
2. **Increasing the added value of bioeconomy products** to at least €3.8 billion by 2030.
3. **Increasing the value of bioeconomy production exports** to at least €9 billion by 2030.

It is critically important to change the societal consumption pattern of society from fossil resource-based goods and materials to bio-based ones.

The Plan means not only the replacement of fossil resources with bio-based resources raw materials, but it also requires cardinal changes in the production chain and processes, considerable investment, and innovation in both the development of new products, as well the modernisation of production and the ability to enter the world's production chains.

The Strategy highlights¹ the importance of result-oriented, efficient, and sustainable resource management, which includes a focus on higher added value products.

The beneficiaries are policy makers, local municipalities, stakeholders, rural areas, and cities.

A bioeconomy impact assessment for all strategic policy documents will follow. By harmonizing the regulatory framework with the bioeconomy strategy, the business environment for entrepreneurship in the bioeconomy could become more attractive. The Strategy could be used as a guidance and reference for the elaboration of local regional strategies, for instance in early 2021, when Latvia's² planning and development regions are expected to develop their strategies³ for the next period.

The Strategy is a key document for local and regional development. Some sectors dominate while others are in the development and expansion stage. Unfortunately, not all traditional sectors are recognized as bioeconomy; only the processing of bio-based raw materials and biopharming is recognized as such. There is still a need to promote the bioeconomy goals and concepts within the society and local communities.

2.5 Smart Specialisation Strategy of the Centru Region 2021-2027, Romania

The EC has recommended that national and regional authorities in Europe develop strategies for research and innovation for smart specialisation to make more efficient use of structural funds and enhancing synergies between national and regional policies as well as between investments in public and private sector. In the financial period 2021-2027, the importance of smart specialisation has increased being designated as a challenge for Policy Objective 1 - A smarter Europe.

During 2020, the Centru Regional Development Agency together with the relevant regional partners developed the new version of the S3 which covers the financial period 2021-2027. The partnership involved in drafting this document was more broadly, covering a wide range of public and private organizations, from universities, R&D institutes, business environment and business support organizations, local authorities, and NGOs.

The regional governance of RIS 3 involves at regional level three actors – the Regional Development Council, the Regional innovation Consortium, and the Regional Development Agency – plus ad-hoc working groups involved in the process of entrepreneurial discovery and which cooperate on three decision-making levels: technical, strategic advisory and strategic decision-making.

In the process of developing the consolidated version of RIS3 (January 2021), the smart sectoral and cross-sectoral areas of smart specialisation have been revalidated following the nine entrepreneurial discovery meetings that took place in September-October 2020; furthermore, the regional governance systems of the Strategy and the monitoring methodology have been improved, the logical framework for intervention has been developed and funding sources have been identified at a conceptual level, taking into account the multi-fund approach of the Strategy, namely the supply, at action level, and in particular at project level, of all innovation support programs.

The first version of the new Strategy went through an evaluation process provided by experts of the JRC of the European Commission. Their recommendations were taken over in the final version. In November 2020, the draft version of the Strategy was submitted to a public consultation process, the comments received being also reflected in the consolidated version.

The beneficiaries are business environment (SMEs; large companies; clusters; entrepreneurs; students with business ideas etc.), research field (universities; public and private research bodies; science and technology parks etc.), public administration and civil society/users (NGOs, consumer associations, talents etc.)

¹ <https://www.pvd.gov.lv/public/ck/files/Latvian-Bioeconomy-Strategy-Summary-WEB.pdf>

² <https://twitter.com/VidzemesRegions/status/1372530532807012356/photo/1>

³ <https://www.kurzemesregions.lv/pazinojums-par-kurzemes-planosanas-regiona-attistibas-programmas-2021-2027-gadam-1-redakcijas-apstiprinasanu-un-nodosanu-publikai-apspriesanai/>

The added value of this good practice consists in: more technology; more innovation determined by a better connection of RDI with industry; stronger local communities, able to solve local problems locally; better positioning in European value chains; more digitalization; better prepared human resources; a modern industry, more connected to international partnerships; more technologically high jobs; ensuring the industrial transition framework (facilitation for the affected territories/sectors); increasing the efficiency of resource use.

Some of the results are:

- identifying **areas of smart specialisation** in the central region;
- **internationalization of the regional economy** and its integration into European value chains;
- a **portfolio of projects with funding sources**; and
- an **action plan for the implementation of RIS 3**.

The expected impacts are:

- industrial **modernization** of regional sectors of excellence;
- creation of **knowledge and innovation** in regional areas of excellence;
- **integration** into regional, European, and global knowledge flows;
- **innovation** for sustainable communities; and
- **digitalization** of the economy and society.

Cross-cutting themes and their distribution among the regional economic sectors of excellence were outlined within the entrepreneurial discovery process as follows: sustainable economy (circular economy; collaborative economy; local value chains); industrial modernization (modernization of production processes through new technologies; development of new products, new prototyping, and testing technologies; digitization); energy in the built environment.

The hardest part was ensuring convergence with the priorities at European level (i.e., agri-food with bioeconomy; smart farming; short food supply chain; circular economy; sustainable agriculture; food safety). In our opinion, the selection of fewer areas of smart specialisation (maximum five and not nine) and grouped in two categories (traditional and horizontal) with a cross-sectoral approach would have been better.

2.5.1 Strategies for Regional INnovative Food Clusters (STRING)

STRING⁴ is an INTERREG Europe project run between 2017 and 2021, aiming at improving the performance of regional development instruments and programmes in building strong agri-food innovation systems across Europe. The starting point was the identified need to improve the policy instruments related to the agri-food innovation ecosystem, to tackle efficiently the cluster integration problems of the SME`s, and to profit from the flow of information.

Objectives:

- To improve the performance and implementation efficiency of **development policies** related to food R&D&I.
- To promote innovation, to deepen food cluster integration and to create **more added value**.
- To stimulate interregional learning, **knowledge exchange** and inter-cluster cooperation.

Activities:

- Identifying the **learning needs** in each region.

⁴ <https://www.interregeurope.eu/string/>

- Compile a collection of **good practice examples**.
- **Study visits and staff exchange** programmes.
- Stakeholder **involvement** in all activities.
- Preparing an **action plan** to improve the regional and national policy instruments related to the agri-food innovation ecosystem.

The project targeted the stakeholders from the agri-food sector in each region where the project is being implemented (seven regions: North Brabant from the Netherlands, Alsace from France, Emilia-Romagna from Italy, Castilla y Leon from Spain, Northern Great Plain from Hungary, Midtjylland from Denmark, and Centru Region from Romania).

The outputs were: seven action plans addressing improvements in seven regional policy instruments related to the agri-food innovation ecosystem and the collection of best practices and their adaptation strategies in food innovation.

Some of the results were: improvement of the performance and implementation of regional development policies and programmes related to agri-food innovation; deepened intra- and inter-cluster collaboration serving the proper operation of food innovation value chains in the partner regions; strategies for creating added value are adopted and successfully used; improvement of the position of agriculture and food innovation in the regional development by a better harmonization of the policy instruments.

The active involvement in the elaboration process of the S3 of Centru Region for 2021-2027 – and the participation in the focus group for the agri-food industry represents an added value for the implementation of the project.

During the implementation of the project activities, we have learned from the best practice examples:

- **Awareness** of our values – and to be able to promote these values (biodiversity, multiculturalism, tradition).
- **Implementing best practice examples** by taking into consideration the local needs (innovation of tradition, Protected Designation of Origin/ Protected Geographical Indication policy mix).
- **Change is possible** — by active involvement of the stakeholders, together with local, regional, and national policy makers.

The hardest part was to put the policy makers at one table with the stakeholders, and to change the companies' approach towards enhanced cooperation.

2.6 Main features of regional strategy initiatives

A synthesis of the main characteristics was performed in the table below to provide an overview of these initiatives for elaborating an approach for the previously mentioned OIP regions.

Table 1: Features of regional strategy initiatives

Strategy	Country	Main outputs	Priorities	Main lessons
Strategy for strengthening the role of the agricultural sector in the bioeconomy	BG	1 Strategy	<ul style="list-style-type: none"> - Sustainable management and development of agriculture, forestry, and fisheries - Full use and development of research, partnerships for exchange and transfer of innovations - Improving knowledge and skills 	The multiplier effect of this national agricultural strategy on other economic sectors (i.e., forestry, fisheries)
S3 in North Macedonia	MK	1 Strategy	<ul style="list-style-type: none"> - Mapping of smart specialisation sectors in the North Macedonia - Identification of policy support measures and of needed investments; - Identification of challenges and needs for knowledge-based development, including ICT-related measures - Technological support as well as practice-based innovation - Stimulation of private sector investment - Full involvement of stakeholders and encourage innovation and experimentation. 	<ul style="list-style-type: none"> - The balance between number and complexity of objectives and allocated financial resources - The importance of building on country's/region's strengths, competitive advantages, and potential for excellence
Local Economic Development Strategy of Strumica	MK	<ul style="list-style-type: none"> - Analysis of the environment - SWOT Analysis - Defining the vision, mission, and common values of the Municipality of Strumica - Defining priority areas, strategic goals, and projects - Guidelines for monitoring and evaluation of results (monitoring and evaluation) - Risk management procedure. 	<ul style="list-style-type: none"> - Development of agricultural sector - Better life in rural area - Better road infrastructure towards the industrial zones - Highly developed and trained workforce - EU House, centre for raising awareness - Street Smart LED Lighting - AgroFair 2019 	<ul style="list-style-type: none"> - Involvement of different stakeholders in elaboration of this strategy - The co-creation principle in elaborating of this local strategy that can be translated for the adoption and development of a regional bioeconomy roadmap/strategy

		- An action plan for implementation		
Latvian Bioeconomy Strategy 2030	LV	1 Strategy	<ul style="list-style-type: none"> - Increasing of the value added of the bioeconomy products to at least €3.8 bn by 2030 - Increasing of the value of bioeconomy export production to at least €9 bn by 2030 - Advancement and retention of employment in the bioeconomy sectors to at least 128,000 persons - Assessment of bioeconomy impact in all relevant strategic documents 	<ul style="list-style-type: none"> - Promotion of bioeconomy within society and local communities is needed further - A deep analysis of traditional sectors should discover new areas of bioeconomy because the strategy is focused only on the processing of bio-based raw materials and on biopharming
S3 of the Central Region in Romania	RO	<ul style="list-style-type: none"> - Identification of smart specialisation areas in the Central region - A portfolio of projects with funding sources - An action plan for the implementation of RIS 3 	<ul style="list-style-type: none"> - Industrial modernization of regional sectors of excellence - Creation of knowledge and innovation in regional areas of excellence - Integration into regional, European, and global knowledge flows - Increasing innovation for sustainable communities - Digitalization of the economy and society 	<ul style="list-style-type: none"> - "Less is more": fewer areas of smart specialisation (maximum 5 and not 9) and grouped in two categories (traditional and horizontal) with a cross-sectoral approach - The way to ensure convergence with the European priorities (i.e., agri-food within bioeconomy; smart farming; short food supply chain; circular economy; sustainable agriculture; food safety)
STRING - Strategies for Regional INnovative Food Clusters	RO	<ul style="list-style-type: none"> - 7 action plans addressing improvements in seven regional policy instruments related to the agri-food innovation ecosystem - Collection of best practices and their adaptation strategies in food innovation 	<ul style="list-style-type: none"> - Improvement of the performance and implementation of regional development policies and programmes related to agri-food innovation - Intra and inter cluster collaboration is deepened serving the proper operation of food innovation value chains in the partner regions - Improvement of the position of agriculture and food innovation in the 	<ul style="list-style-type: none"> - Awareness of our values – and of promotion of these values (biodiversity, multiculturalism, tradition), as well as on best practice examples that can be implemented by taking into consideration the local needs - The change is possible by an active involvement

			regional development by a better harmonization of the policy instruments.	of the stakeholders, together with local, regional, and national policy makers
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3 Best practices on business model initiatives

Best practices of bioeconomy initiatives in BE-Rural's OIP regions (or in their countries) include bioeconomy-related innovative / pilot initiatives or approaches to building new value chains, but also some initiatives, which suggest that capitalizing on traditions in the use of local biological resources is a successful approach to strengthening the local bioeconomy.

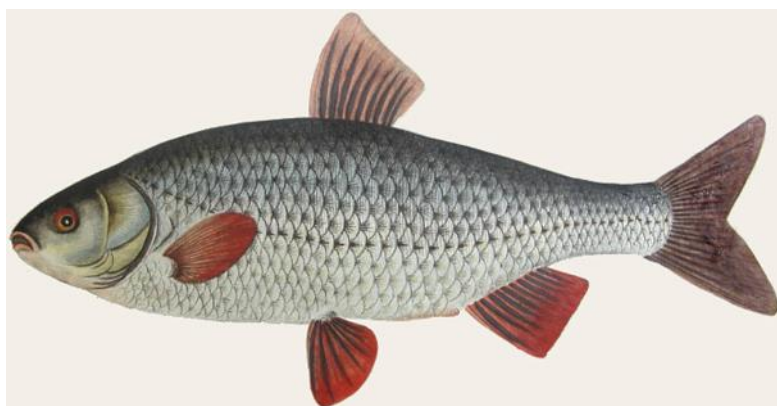
The case studies were selected based on the advice of the OIP facilitators, but also of specialists from the countries and regions represented by these facilitators, who attended the inter-regional webinars. For drafting these case studies, the research was completed also through written and phone exchanges with national-level bodies and policy makers and of course different local stakeholders. The selection covered also more criteria such as:

- **Geographical scale:** The business models initiatives cover either a region (Stara Zagora Region in Bulgaria, Strumica Region in North Macedonia, Vidzeme Region and Kurzeme Region in Poland) or communities (Municipality of Novo Selo, North Macedonia, Municipality of Strumica, Strumica Region in North Macedonia, the villages Ghelinta and Estelnic Communes, Covasna County).
- **Thematic focus:** Areas of these business model initiatives can positively influence different component of the bioeconomy, such as agriculture (the case of Stara Zagora Region in Bulgaria), blue economy (the cases of Nowa Pasłęka and Świnoujście Suburbia in Poland), forestry and related fields (the cases of Vidzeme and Kurzeme Regions in Latvia), renewable energy (the cases of villages Ghelinta and Estelnic Communes in Covasna County, Romania).
- The initiators are in most cases **private entities**.
- Participants: The **stakeholders** who have initiated the processes are open to the cooperation with stakeholders from other related fields and at different levels (regional, local).
- **Transferability:** The initiated processes have some similarities as it the case of the two examples for utilisation of sludge form the wastewater treatment in Stara Zagora Region in Bulgaria and in the Strumica Region in North Macedonia. This is a proof that such examples can be replicated also in some other regions with similar needs.
- **Learning** from others is a continuous process based on the obtained results by all the initiators of the presented best practices.

The technology-related initiatives can be branded as best practices for the development of roadmap documents. If those are possible to replicate, they can serve as inspiration for other regions to include in their roadmap documents.

3.1 Poland - Business model initiatives in Szczecin Lagoon and Vistula Lagoon

The examples identified in the Polish lagoons represent best practice for the exploitation of aquatic biomass that fall within the sphere of the blue bioeconomy. We refer to low-value fish species of brackish waters in Szczecin Lagoon and Vistula Lagoon.

Figure 3: Rutilus (Linnaeus, 1758) Roach

Source: Animal Base⁵

In the following, we present two initiatives in these areas, which reflect the trend that is gradually emerges amongst the locals.

3.1.1 Closing the production chain for low value fish species – Nowa Pasłęka, Poland

This is the case of a fisherman in a small village who decided to extend his activity and start fish processing on a small scale. This unusual production facility offers products from small bream, roach, ruffe, smelt and other not commonly used fish species. Exploiting to the maximum his own endowments, this small entrepreneur manages to convince customers to go for low added value fish instead of perch, eel etc. He chose his own bistro as distribution channels as well his own logistic service, which allowed the extension of his market size for canned fish production in this phase. In the next phase he plans to invest in his own logistic service, which allowed the extension of his market size for canned fish production. This will of course result in an increased workforce.

This initiative is beneficial not only for the small entrepreneur, but also for the community in which he lives: fishermen, owners of agricultural land and the whole region. By processing low value fish species this fisher can utilize almost 100% of catches for the purpose of human consumption. It may help the whole community of fishers to sell less valued fish species. Added value from processing will stay in the region. Furthermore, this could lead to decreased unemployment rate and the creation of new skills connected to regional traditions.

Knowledge of the resources and environmental capacity is a success factor. Personal connections to processors and good idea for a new product is a good start.

3.1.2 A feeling of good taste – Świnoujście Suburbia, Poland

This is another case in which a small entrepreneur manages to capitalize on local resources: lesser-known fish species (typically low value fish species), the surrounding landscape, culinary tradition, and local hospitality. The business owner sells unusual things, which are not available regularly, but according to the availability of raw material. Tourists are curious of such products, which are shown on the facility website.⁶

It is open for all guests, but such experience is more valued by older, well-educated, and middle-class clients, so the prices tend to be higher.

⁵ <http://www.animalbase.uni-goettingen.de/zooweb/servlet/AnimalBase/home/picture?id=27>

⁶ <http://ptaszarnia.pl/nasze-atrakcje/ptaskowa-spizarnia/>

Region becomes popular as a quiet, relaxing place near the coast. Neighbours have larger incomes thanks to cooperation and taking part of the tourist flow to their facilities, Fishers have extra income through commercialisation of fish species that are not popular among mainstream tourist groups.

Selling an experience and a promise of good value food and regional lifestyle is one of the most original business models in the region. They do not only offer a specific product but the possibility to taste it (if you are lucky). It means some dishes are available when the owners get specific ingredients, some are seasonal and some are on special orders for well known, frequent guests.

Family-owned and -led initiatives, using regional tradition as promotion, developing a need for their services among targeted segment of tourists can represent a way to success.

Figure 4: Traditional Foods



Source: Guest House Ptaszarnia on Karsibór Island in Świnoujście, Poland⁷

3.2 Bulgaria - Business model initiatives in Stara Zagora Region

The example identified in Bulgaria, as a good practice, refers to an innovative solution spread in the Stara Zagora region for the ecological use of large amounts of sludge, generated by wastewater treatment plants.

3.2.1 Production of bio stimulants by processing sludge from domestic wastewater treatment plants in Stara Zagora Region^{8 9 10 11}

Due to national and EU requirements, municipalities in Bulgaria built more and more wastewater treatment plants and their number increases from 79 in 2010 to 173 in 2019. Six of them, along with the one founded in February 2021, are in the Stara Zagora region. Thus arose the need to make use of big quantities of sludge generated from domestic wastewater treatment plants.

Scientists from the Faculty of Agriculture of the Thracian University, in the city of Stara Zagora, have created an innovative product that will utilize the sludge and largely replace the use of mineral fertilizers in plants and will enable them to better cope with drought, cold and other adverse conditions. They have created a spin-off company "Atlas Agro Science". They won the first prize of the EIT Food Innovation Prizes 2020 – a competition for start-up companies in the agri-food chain. Atlas Agro Science recently received the Agro-innovator of the Year award in Bulgaria.

⁷ <http://ptaszarnia.pl/nasze-atrakcje/ptaskowa-spizarnia/>

⁸ <https://atlasagro.eu/>

⁹ <https://www.agroinnovations.bg/atlas-agro-science-e-pobeditelyat-v-blgarskiya-final-na-eit-food-innovation-prizes>

¹⁰ <https://www.f6s.com/atlasagrosience>

¹¹ <https://divident.eu/1469/bulgari-izobretiha-biostimulant-za-rasteniya-namalyavash-toreneto-s-40/>

Atlas Agro Science seeks to reduce the inefficient disposal of sludge from the treatment plants and the growing use of mineral fertilizers in agriculture, which leads to serious risks, not only for the environment but also for human health. By implementing an innovative patented technology and applying the principles of the circular economy, they developed products using completely waste-free technology, which is completely safe for the environment.

With the use of the Atlas Agro product range, the agricultural producers / farmers can increase their yields, reduce their fertilization costs, and move to cleaner agriculture. In addition, with the replacement of mineral fertilizers in plants, they will be more resistant drought, cold and other adverse conditions.

Figure 5: Mineral fertilizers



Source: Bulgarian Waters Association¹²

This innovative solution can benefit more entities, as for example:

- Wastewater treatment plants – to collect the sludge from them and process it.
- Producers / farmers, for whom this solution is an opportunity to reduce their fertilization costs and move to cleaner agriculture. Through this new product range, the farmers can increase their yields by up to 10% and obtain production of more resistant plants.
- Growers of flowers / plants – to use the product instead of mineral fertilizers and make flowers more resistant as well. 40% of the need of plants for mineral fertilizers will be reduced.
- Distribution companies – to sell the products across the country.

The method has a positive impact on the environment in several ways:

- management of waste of biological origin;
- carbon emissions or the so-called carbon footprint is reduced, as the technology of production has almost no impact on the environment /the product is completely biodegradable;
- the use of mineral fertilizers will be reduced; and
- it improves the resilience of plants /to drought, cold and other adverse conditions/, which directly helps the fight against climate change.

The method is based on the principle of the circular economy and shows how a waste can be turned into a useful product (in line with the "Green Deal "). One more important aspect that there is no waste left from it.

¹² <https://bwa-bg.com/en/>

The values and ideals of Atlas Agro Science do not differ from those of any other developing business in the field of ecology. It is important that the company succeeded to combine the protection of the environment, the use of recycled products and the introduction of waste raw materials in production to reduce pollution. The company not only relies on the principle of the circular economy, but also successfully manages to sell products with zero waste, which offers a great advantage over competitive but unsustainable businesses in the same sector.

The greatest challenge was the formulation of the criteria for the wastewater treatment plants which sludges are appropriate for treatment and processing of fertilizers and bio stimulants – for example absence of heavy metals and contaminants from microbiological and parasitological origin.

Dissemination of information is important to achieve better results, in terms of more investments in the wastewater treatment facilities.

Further development may be in the field of using different types of sludges and elaboration of methods for their neutralization and disposal. The time frame of this activity is permanent.

The geographical reach can be extended towards other regions of Bulgaria or other countries.

Through this new product range:

- the farmers can increase their yields by up to 10%, reduce their fertilization costs and move to cleaner agriculture
- 40% of the need of plants for mineral fertilizers will be reduced

The time frame of this activity is permanent and can be spread across Bulgaria.

3.3 North Macedonia - Business model initiatives in Strumica Region

The examples in North Macedonia refer to best practice in actual fields and which offer technological solutions for bio-based industries in the Strumica Region.

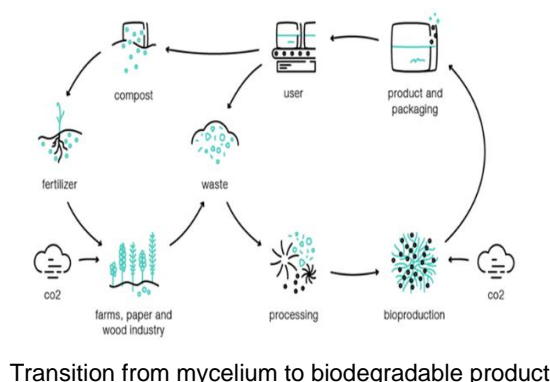
Main technology topics we are referring to are:

- Mycelium - based packaging and insulation materials in Strumica Region
- Compost Production in Municipality of Novo Selo
- Utilisation of sludge from the wastewater treatment in Municipality of Strumica, Strumica Region

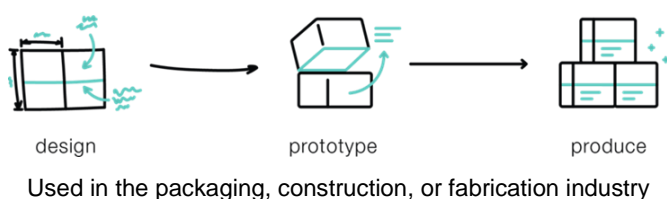
3.3.1 Mycelium - based packaging and insulation materials in Strumica Region

This example of good practice addresses a need to find an effective, inexpensive, and green replacement for Styrofoam for disposable packaging.

Figure 6: Packaging and insulation materials



Transition from mycelium to biodegradable product



Biodegradable substitute to expanded polystyrene

Source: SOMA™¹³.

Polystyrene, better known as Styrofoam, is a material encountered almost every day – from thermal packaging for food, an affordable option for thermal insulation of houses and compact protection during transport. However, the impact it has on the environment is far from positive. Many of the materials that have shaped modern life, on the other hand, have contributed to significant environmental pollution. The discovery of artificially synthesized materials and the industrialization of production processes have enabled the wide distribution of certain materials, which as a side effect leaves huge consequences, both on the environment and on human health. The existence of micro-plastics in the living world, the emission of carbon dioxide and the creation of a greenhouse effect that is rapidly contributing to global warming, are scenarios that are already happening to a large extent. Motivated by the principles of sustainability and the desire for ecological innovation, the BioPAT company, deals with the cultivation and production of Biosporin as an ecological competitor to traditional Styrofoam.

The use of Styrofoam as a disposable packaging material is one of the main sources of microplastics, because Styrofoam is not degraded or recycled. It either ignites and generates greenhouse gases, or is dumped in landfills, from where it decomposes into microplastics. Agricultural waste is also burned every year and causes significant pollution in the autumn, which impacts the population. This was the rationale for providing an efficient, cheap, and green replacement for Styrofoam for one-time packaging. Agricultural waste and biological organisms are used to produce new biotic material and grow products from it. The whole process is completely green and natural, without waste and pollution.

Produced in a biological process, of natural origin, Biosporin is classified with materials such as wood, leather, or rubber. It also has an equally wide range of potential uses. It is created by mechanical processing, chopping and inoculation of a special type of fungi. The fungus is then moulded into the desired shape and prepared in this way it grows, turning lignin and cellulose from wood into a polymer. After that, the material is dried and finished, depending on the needs of the final product. Depending on the type of waste used for cultivation, conditions during the growing process and final processing, there is a whole range of properties such as softness and hardness, roughness and smoothness, shock absorption, visual quality, and others. By manipulating the density of the fungal fibres, a range equivalent to the range of plastic materials can be achieved. Biosporin is also completely non-flammable. It belongs to the class of materials - A0, which gives it additional advantages over Styrofoam. It is biodegradable in natural conditions - in contact with soil and moisture for more than 4-6 months, through bacteria, the material is completely degraded.

¹³ <https://www.soma.eco/>

The goal is to provide an efficient, cheap, and green replacement for Styrofoam for disposable packaging. The team gathered around this project includes professionals from various spheres of economy, including molecular biology, agriculture, production management, and lastly an indispensable part, financial management.

This technology would be beneficial for the business environment in the Strumica region, for agricultural producers and packaging companies.

Biosporin™ is a biodegradable substitute to expanded polystyrene and can be used in the packaging, construction, or fabrication industry. Products are made using Cradle to Cradle Design as well as Eco-Design and contribute to the cost reduction of packaging. But there are also some aspects to be further developed.

The biggest problems are revolving around health and the environment, as the world is drowning in plastic. Unsustainable treatment of waste: bio-waste, plastic, and fertilizers. The production and disposal of one ton of plastic releases another 8.71 tons of CO₂, 150kg of ash, and 300kg of solid waste particles and micro plastics into the environment. Composing 1 ton of agricultural waste releases 2.5 to 3.7 tons of CH₄ into the atmosphere.

The core of this product philosophy is wrapped around sustainability and eco-friendly production and consumption. So, the intention is to ambitiously target those problems using sustainable biotechnology.

The benefit of this kind of activity could be identified in the cooperation of different stakeholders and professionals from the Quadruple Helix.

Another asset lays in the constant improvement, conducting experiments and collaboration with academia as they are testing various impregnations and coatings, on an ecological basis, which would significantly improve the hydrophobicity of the material and thus increase its lifespan.

In the future, Biosporin is expected to be an effective substitute for Styrofoam.

3.3.2 Compost Production in Municipality of Novo Selo, North Macedonia¹⁴

The Southeast region of North Macedonia has an important potential for compost production. The latest data shows that around 22,000 tons of biodegradable waste each year ends up in the landfills in the Southeast region. The number of agricultural producers that make compost or other kind of profit out of it is insignificant, although the agricultural residues can be successfully utilized for production of organic waste. Such kind of waste is massively produced when the farmers are preparing the fields for new sowing.

The good practice refers to a family who is pioneer in making compost in the area. They are accumulating the organic waste from 3 hectares and produce compost. An aeration is performed every 3 months. Aeration is the process by which air is circulated through the soil. The family is collecting the organic waste (agricultural residues) from their fields and the reed from the nearby swamps which is usually burnt, thus it contributes to the air pollution. Their expectation for 2021 are that 1000m³ of compost will be produced.

As farmers sometimes do not realize the economic viability of the organic waste, they dump their residues on the landfills. Hence this valuable source of energy is thrown away. Nevertheless, the organic waste can be utilized as compost and used for the next years, as a nutrient for the soil.

Additionally, the biomass as renewable source can be found in greater quantities in the following municipalities: Strumica, Bosilovo, Vasilevo, Gevgelija, Radovich and Valandovo. These municipalities are facing the same issues and the potential of the organic waste remains unused.

The Beneficiaries are different entities as: Municipality of Novo Selo, Strumica region, Agriculture Production Units in region, Individual Agriculture Producers, Regional utility companies.

¹⁴ <https://www.youtube.com/watch?v=3rPMzAGjHPI>

Figure 7: Local farmer utilizing the agriculture residues to make compost



Source: <https://www.youtube.com/watch?v=3rPMzAGjHPI>

Some of the positive effects are:

- Production of compost that could be used in the fields.
- Reduction of the organic waste dumped into landfills.
- Less air pollution due to reduced burning of waste.

The implementation of this process has multiple benefits for the region. The technology is straightforward yet contributes to lowering the amount of local waste and improving the quality of the air due to the reduced open burning.

An improvement should be expected in terms of wider acceptance of this practice, meaning that the number of farmers that will be interested to produce compost will enlarge. In the future, this good practice might lead to some more advanced technologies or processes.

3.3.3 Utilisation of sludge from the wastewater treatment in Municipality of Strumica, Strumica Region

The Wastewater treatment plant in the Municipality of Strumica covers an agglomerate with a total of 56,000 PE. The station works successfully and contributes to a significant increase in the quality of biodiversity in the region. As such, in its operation it has high electricity consumption and at the same time produces large quantities of waste in the form of sludge, which further needs to be processed and used.

Sewage sludge treatment describes the processes used to manage and dispose of sewage sludge produced during sewage treatment. Sludge is mostly water with lesser amounts of solid material removed from liquid sewage. Primary sludge includes settleable solids removed during primary treatment in primary clarifiers. Secondary sludge separated in secondary clarifiers includes treated sewage sludge from secondary treatment bioreactors.

Sludge treatment is focused on reducing sludge weight and volume to reduce disposal costs, and on reducing potential health risks of disposal options.

Anaerobic digestion is a bacterial process that is carried out in the absence of oxygen. Mesophilic anaerobic digestion (MAD) is common method for treating sludge produced at sewage treatment plants. The sludge is fed into large tanks and held for a minimum of 12 days to allow the digestion process to perform the four stages necessary to digest the sludge. In this process the complex proteins and sugars are broken down to form more simple compounds such as water, carbon dioxide, and methane.

Figure 8: Wastewater treatment plant

Source: Municipality of Strumica¹⁵

Anaerobic digestion generates¹⁶ with a high proportion of methane that may be used to both heat the tank and run engines or turbines¹⁷ for other on-site processes. Methane generation is a key advantage of the anaerobic process.

Realization of this project requires an additional investment of installing methane tanks and plant for combined heat and power production, an approximate amount of €2 million.

The Beneficiaries of this technology are: Municipality of Strumica, public communal utility, agriculture production units in the region, and individual agricultural producers.

The wastewater treatment plant in Strumica is producing around 1,200-1,400 m³ sludge annually. This is primarily a problem due to the large volume and the costs for storage, but at the same time means a significant loss of energy. The implementation of this project contributes to the significant use of this resource. The plant can produce about 500 MWh of electricity per year.

The project for the utilization of sludge from the wastewater treatment plant in Strumica provides numerous lessons that can be learned and applied to other sectors. Most importantly, however, the envisioned project has shown that something which is considered waste in one sector, can be used as feedstock in another. This not only contributes to a more circular economy, but also points to the ability of the circular economy to address current issues that are otherwise not easily resolved. In the case of this project, the issue that needed to be solved was the large energy demand of the treatment plant and the large quantities of waste. By using the sludge as feedstock for anaerobic digestion, the authorities achieve both a reduction of waste and a creation of value from the generated energy (to be implemented as a project). There are different cases where this concept can be used. For example, there is a lot of agricultural residue from the Strumica region, which is left unutilized. By having best

¹⁵ <https://strumica.gov.mk/mk/juli-129/3937-prechistitelnata-stanica-vo-strumica-kje-bide-pushtena-prva-poradi-navremeno-ispolnetite-obvrski-na-opshtinata>

¹⁶ <https://en.wikipedia.org/wiki/Biogas>

¹⁷ <https://en.wikipedia.org/wiki/Microturbines>

practices such as the utilization of sludge from the wastewater treatment plant, the local population will be more informed and familiar with the opportunities for a circular economy. This should increase the awareness of local farmers and inform them of the other existing revenue streams that they may have from their land.

3.4 Latvia – Business model initiatives in Vidzeme Region and Kurzeme Region

The examples of good practice from the regions of Latvia refer to innovative products made from forest biomass, knowing that the forestry sector is traditionally one of the most important in the country's economy.

3.4.1 Fabrics from lying trees – Vidzeme Region¹⁸

The pilot cases were started a few years ago because of objective economic needs, but fabric production is still in a development stage.

After forest tending, because of the small tree dimensions and high costs that are related to collecting these trees, a lot of tree trunks are left on the ground. The same happens after windfalls, when some tree trunks, especially old ones, are knocked down and are lying on the ground. Individual tree trunk extraction and transportation from forest does not pay off and they are left unused.

These tree trunks that are laying on the ground could be used as raw material for fabrics, which could be made from tree parts (the part of the tree that is between tree bark and timber). This tree part is manually collected in spring (trees should lie on ground for one winter, where temperature and moisture fluctuations are required) and manually washed, where fibre is obtained. This fibre could be used in fabric making. Other tree parts, besides this tree part, are left in the forest for biodiversity.

The beneficiaries are customers who want to wear natural and eco-friendly clothes and forest owners, who can use forest resources in additional products, beside timber production.

Added value comes from fully used nature resources, which are otherwise not used and are left in the forest. This type of fabric production is historically old, but in nowadays not used at all. It is eco-friendly fabric where no chemicals are used in production. Outputs will be nature friendly fabric, made from non-used tree parts what are left in the forest. Results will be new fabrics made from trees, which will support local businesses. The expected impact is eco-friendly fabric production, which will attract people's attention towards the use of natural resources. It will change the conceptions in people's minds about how everyday products can be produced in a sustainable way that also supports local businesses.

Latvian folklore could be used as an inspiration for bio-based business development. Latvian folk songs contain information about different species of wood and wool clothes and accessories. The author of the idea was inspired by local handcraft. He is focused on both functional and pharmaceutical use of tree bark, especially of aspen and oak. He also produces aspen and oak bark extracts as alternative of traditional medicine (for external use).

3.4.2 Needles as high-quality raw material – Kurzeme Region

Starting point was in 1993 with an idea that came from long-term research about forest biomass and how to gain profit by producing high-quality and environmentally friendly bio-active products of ecologically clean forest resources, mainly from the green mass (spruce and pine needles). Needles of evergreen trees are considered a cheap and ecologically clean source of high-quality raw materials used in sectors such as medicine, cosmetology, livestock breeding and plant protection. The philosophy of this activity was to replace synthetic products with high-quality bio-active natural products, derived from renewable plant materials by applying environmentally friendly lean

¹⁸ <http://razotsmadona.lv/koku-un-augu-vilnas-meistars-ritvars-tocs/>

technologies. This is done by scientists together with the business sector. The beginnings and development of AS “Biolat” is closely related to the Latvian State Forest Research Institute Silava, the Latvian OIP facilitator in BE-Rural. The company’s primary business is processing of plant raw materials (mainly conifer needle foliage) to extract the bio-active substances and turn them into high-quality products that are good for strengthening health, supplementing diet, cosmetic use, and plant protection.

Over the years, AS “Biolat” has gained experience in studying the chemical content of materials and application of extract matter of plant, mainly conifers.

Company’s research activity covers various economy sectors — food production, pharmacy, cosmetology, plant protection, agriculture, feed production, etc.

Beneficiaries are people, who like to use ecological and clean products, also some forest owners, who can use their forest as addition income source, besides timber production.

Figure 9: “Biolat” research company



Source: JSC Biolat.¹⁹

Scientists have long been drawing our attention to the surprising similarity of many compounds found in the green parts of plants and the human organism, for example the similarity between plant chlorophyll and haem of haemoglobin in blood, plant polyphenols and animal dolichols, etc. It has been proven that the shortage of some compounds in organisms can be eliminated with plant products, thus ensuring again the functioning of the body. AS “Biolat” has expanded its product range with several products – food supplements and medical devices, that are based on pharmacological or physiological properties of other plants.

This activity showed that science should work together with industry to invent and produce valuable products. The hardest part is to use all the components of the raw material. Now just parts of the raw material are used in products. In the future, products should be promoted in biological farming distribution networks.

3.5 Romania - Business model initiatives in Ghelinta and Estelnic Communes, Covasna County

The examples of good practice in Covasna County are based on a long tradition of caring for the environment. Thus, the inhabitants were concerned, among others, with the idea of finding solutions for a sustainable and efficient way of heating by exploiting wood biomass, which is the most important local renewable energy resource.

3.5.1 Bioenergy villages Ghelinta and Estelnic Communes, Covasna County

The bioenergy village concepts of Estelnic and Ghelinta Communes in Covasna County were presented extensively in the European project Bioenergy Villages (Biovill). They refer to the meaning

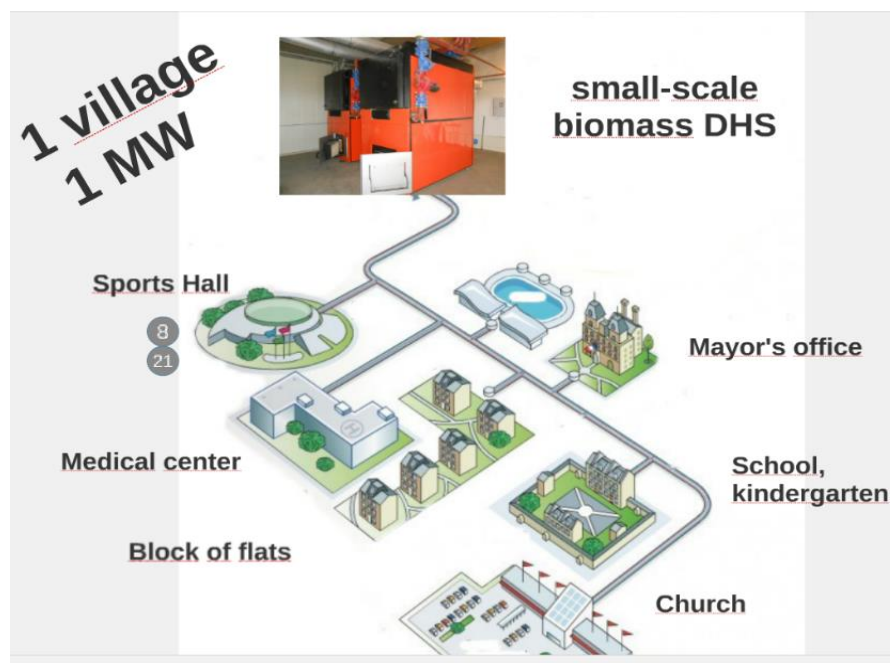
¹⁹ <https://www.biolat.lv/en/about-us/>

of a bioenergy village concept: “A bioenergy village is a village, municipality, settlement or community which produces and uses most of its energy from local biomass and other renewable energies”.

An integrated model of a community-scale-energy system called 1 Village – 1 MW was developed in the Estelnic and Ghelinta Communes.

Small-scale bioenergy systems are plants of up to 1 MW of energy generating capacity. They have the advantage of being able to be distributed throughout a community.

Figure 10: The 1 village – 1 MW model



Source: Designed by Tihamer Sebestyen within the Biomass - the green business²⁰

Many South-Eastern European countries have high biomass potentials, but these are often not or only inefficiently used for local energy supply and regional economic development. Thus, the overall objective of the BioVill project (Horizon 2020, run 2016-2019, biovill.eu) was to support the development of regional bioenergy concepts and the establishment of bioenergy villages in Croatia, North Macedonia, Romania, Serbia and Slovenia. This will have been achieved by identifying suitable biomass value chains according to local and regional needs and transferring existing experiences in Austria, Germany, and other European countries to the South-Eastern European partners. Thereby the market uptake of domestic bioenergy supply chains will have been increased and the role of locally produced biomass as a main source of energy supply and added value for the local and regional economy will have been strengthened.

Major beneficiaries of the BioVill project are bioenergy villages in the target partner countries (Romania, Serbia, North Macedonia, Croatia, and Slovenia) up to the investment stage for physical infrastructure, the raise of public acceptance and awareness of a sustainable bioenergy production and its commercial opportunities as well as increased capacities of users and key actors in business and legislation to sustainably manage bioenergy villages and to enact national and EU legislation. Altogether, the BioVill project will contribute to the expansion and sustainability of the bioenergy markets in Europe and the European Union.

In the framework of BioVill project, there were seven bioenergy villages presented in the target countries, such as Estelnic and Ghelinta in Covasna County in Romania. There were installed of up to

²⁰ Green Energy Association (2015): “Biomass - the green business”, URL: <https://eeagrants.org/archive/2009-2014/projects/RO17-0030>

2 MW bioenergy capacities in Estelnic and Ghelinta at private businesses, public institutions, and establishment of two local biomass supply value chains.

The main lessons learnt from the BioVill project include the importance of identification of key stakeholders; engagement of local stakeholders is the key for successful implementation of the project. Another success factor was the multi stakeholder approach fostering the involvement and active participation of the citizens and all relevant stakeholders in the planning and implementation process.

3.6 Main features of business model initiatives

Some messages with wider relevance beyond the above-described examples for business models in the OIPs that could be seen are cooperation in a Quadruple Helix setting, communication / dissemination awareness raising, identification of key stakeholders or tradition can be the basis for innovation. Even though some of these aspects are only mentioned in one case, they are still good findings which can be applied in other settings related to the development of strategy or roadmap documents for strengthened regional bioeconomies.

Table 2: Features of business model initiatives

Business Model	Country	Main outputs	Main results	Main lessons
Closing the production chain for low value fish species	PL	1 fish processing facility 1 restaurant 1 logistic service	Utilization of almost 100% of fish catches for human consumption purpose Added value from fish processing stays in the region Unemployment rate falls and new skills connected to region tradition are being demanded	Knowledge of the resources and environmental capacity is a success factor Personal connections to processors and good idea for a new product is a good start
A feeling of a good taste	PL	1 guest house	Region becomes popular as a quiet, relaxing place near the coast. Neighbours have bigger income thanks to cooperation and taking part of the tourist flow to their facilities. Fishers have extra income from fishes which are not popular among main tourist flow	Scale up of the business model and involvement more investors from the region (similar guesthouses, local restaurants offering food experience, other services like bike or boat rental)
Production of bio stimulants by processing sludge from domestic wastewater treatment plants	BG	Management of waste of biological origin	Carbon emissions or the so-called carbon footprint are reduced, as the technology of production has almost no impact on the environment / the product is completely biodegradable	The greatest challenge was the formulation of performance criteria PR and dissemination of information is crucial for obtaining better results

			<p>Use of mineral fertilizers will be reduced.</p> <p>It improves the resilience of plants to drought, cold and other adverse conditions, which directly helps the fight against climate change</p>	
Mycelium – based packaging and insulation materials	MK	Biosporin™ is a biodegradable substitute to expanded polystyrene	<p>Capitalize on consumer trends for biodegradable packaging options</p> <p>Become more eco-friendly</p> <p>Reduce cost for packaging</p> <p>Coattail on the marketing and benefit from cross-promotion</p> <p>Maintain brand image and packaging competitiveness</p>	Cooperation of different stakeholders and professionals from the Quadruple Helix
Compost production	MK	Production of compost that could be used in the fields	<p>Reduction of the organic waste dumped on the landfills</p> <p>Less air pollution due to lesser waste burning</p>	An improvement should be expected in terms of wider acceptance of this practice, meaning that the number of farmers that will be interested to produce compost will enlarge
Utilization of sludge from the Wastewater treatment plant in Strumica	MK	Wastewater Treatment Plant in Strumica is producing around 1,200-1,400 m3 sludge annually	The plant can produce about 500 MWh of electricity per year	The example has shown that something which is considered waste in one sector, can be used as feedstock in another. This not only contributes to a more circular economy, but also points to the ability of the circular economy to address current issues that are otherwise not easily resolved. There are different cases where this

				<p>concept can be used. For example, there is a lot of agricultural residue from the Strumica region which is left unutilized. By having best practices such as the utilization of sludge from the wastewater treatment plant, the local population will be more informed and familiar with the opportunities for a circular economy. This should increase the awareness of local farmers and inform them of the other existing revenue streams that they may have from their land</p>
Fabrics from lying trees in forest	LV	Eco- friendly fabric, made from unused tree parts what are left in forest	<p>Support to local businesses</p> <p>Change of paradigm in the way people see sustainable production and consumption</p>	<p>In bioeconomy we should revive traditional skills that have gone forgotten and could lead to new business ideas</p> <p>Bio-economical products may be used in multiple ways: functional, pharma, educational, ecological</p> <p>Waste can produce added value through innovative business models</p>
Needles as high-quality raw material	LV	Product range with several products — food supplements and medical devices, that are based on pharmacological or physiological properties of other plants	It has been proven that shortage of some compounds in organism can be eliminated with plant products thus ensuring complete body functioning	In the future, products should be promoted in biological farming distribution networks

Bioenergy Villages	RO, RS, HR, MK, SI	7 bioenergy villages in the target countries	Installation of up to 2 MW bioenergy capacities in Estelnic (RO) and Ghelinta (RO) at private businesses, public institutions, and establishment of 2 local biomass supply value chains	<p>Importance of identification of key stakeholders.</p> <p>Engagement of local stakeholders is the key for successful implementation of the project</p> <p>A multi stakeholder approach fostering the involvement and active participation of the citizens and all relevant stakeholders in the planning and implementation process</p>
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4 Synthesis

Favourable experiences in the selected best practices support the idea that the bioeconomy can potentially make a decisive contribution to sustainable rural development.

However, the transition to a circular bioeconomy requires the active involvement of local actors, respectively a quintuple helix approach,²¹ as shown by the development of the mycelium-based packaging and insulation materials in North Macedonia. This involves, among other things, capacity building among regional stakeholders in evaluating innovative business models based on bio-industries, in analysing their impact on the market, as well as in the efficient use of available funding flows.

As a general remark, all reviewed best practices have a high degree of complexity, given that they relate to the varied field of bioeconomy. In that sense, transferability to other sectors, in particular agriculture and forestry comes as a natural conclusion, as shown in the Strategy for strengthening the role of agriculture in the bioeconomy in Bulgaria.

One of the main added value lies in the methodological approach of the selected best practices. Ensuring the consistent application of an appropriate methodology is key for the achievement of useful results. The methodological approach is not linear; it requires a high degree of flexibility and implies several feedback loops and setbacks. A balance between the number and complexity of objectives and allocated resources should be kept in mind. Experiences show that sometimes “less is more” and a thematic concentration is highly recommendable, as shown by the S3s in the Centru Region of Romania and in North Macedonia. Furthermore, the greatest challenge lies in the formulation of performance indicators, as shown by the examples of bio-stimulants production in North Macedonia. The correct identification of the key stakeholders can be the crucial factor in making an initiative a success or a failure, as shown by the example of the bio-villages in Romania. To achieve this, appropriate PR and dissemination of information procedures should be in place.

While bioeconomy is a “new” industrial field, the contribution of / to traditional sectors (e.g., textiles, fishing etc.) should not be neglected, as seen in the case of the Latvian Bioeconomy Strategy and the production chain for low value fish species in Poland. The main advantage of these sectors is that they rely on solid values which make the mind-set changing process required by the bioeconomy approach easier; change is possible by the active involvement of local stakeholders together with local, regional, and national policy makers, as seen in the Strategy for Regional Innovative Food Clusters in Romania.

This comes along with the revival of traditional skills that have gone forgotten and could lead to the development of new business as it is the case of the fabrics from the lying trees in Latvia. These business models are green, as bio-based products can be used in several ways: functionally, pharmaceutically, educationally, and ecologically, to give only a few examples.

Summing up, best practices play a significant role in supporting the development of bioeconomy strategies, roadmaps, and business models in the OIP regions. In addition to that, they can be used even after the end of the project by the interested parties. The processes launched within the BE-Rural project will be continued inside the networks created in the field of bioeconomy both at regional and European level. From the presented cases, the idea is outlined that the efforts to align with the requirements induced by the global economic tendencies, can contribute to the improvement of the economic situation in the less developed areas.

In the context of BE-Rural, the best practices in strategy, technology, and product development, as described above, are a source of learning, which is useful further in the project work. In particular, the findings of this report contain valuable insights that can support the five BE-Rural OIPs in the formulation of strategy and roadmap documents, as foreseen in Task 5.4. In the course of this work, strategy development processes could benefit from the provided examples and lessons concerning priorities’ selection, participatory approaches to involve stakeholders, and coordination mechanisms.

²¹ “The Quintuple Helix Approach is one of the key principles of BE-Rural’s conceptual framework. It means combining knowledge and innovation generated by stakeholders from policy, business, academia and civil society, while taking into account the natural and managed ecosystems in which these are located” (Davies and Kah 2019, p. 7).

Roadmap documents, on the other hand, could be informed and inspired by the presented on-the-ground applications of the bioeconomy, for instance, regarding connecting sectors and building new feedstock flows, engaging local communities as active players in the bioeconomy, developing market niches, etc. Finally, this report also indicates that the successful process of bioeconomy strategy and roadmap development is not straightforward and depends on certain prerequisites. An example is the need for capacity building of diverse stakeholders that would enable a genuine bottom-up approach (this is embedded in BE-Rural's Tasks 4.3 and 4.4 as well). Another is the setting up of an innovative governance structure that enables the various sectors, policies, and stakeholder groups to come together and to ensure informed decision-making (which BE-Rural's regional Stakeholder Working Groups aim to address).

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